

Claims

1. A process for the production of thermal and electric energy in a pulp mill, according to which process the waste liquor of the cellulose pulp digestion liquor is concentrated, and this concentrated liquor is burned in the recovery boiler in the presence of biogenic fuels,
5 the thermal energy of the flue gases obtained from the burning being recovered and, optionally, being converted to electric energy, **characterized** in that the biogenic fuel used is bark or other similar wood waste, which is dried to a moisture content below 30 %, whereafter it is gasified to produce a fuel gas that is fed into the recovery boiler.
2. The process according to Claim 1, **characterized** in that the bark or bark residue is
10 dried to a moisture content below 20 %, whereafter it is gasified, and at least 40 % by volume of the gas thus produced is fed into the recovery boiler.
3. The process according to Claim 1 or 2, **characterized** in that ash is separated from the fuel gas before it is fed into the recovery boiler.
4. The process according to any of the preceding claims, **characterized** in that the heat
15 produced using the fuel gas is used for superheating the soda recovery boiler steam in a superheating chamber separate from the flue gases of the soda recovery boiler.
5. The process according to any of the preceding claims, **characterized** in that the waste wood is bark waste, bark-containing sludge, fiber sludge, branch or fiber reject from classification or surplus sludge from biologic wastewater treatment or logging waste, fire-
20 wood separately harvested from the forest, surplus wood from wood processing, or other wood material suitable for burning.
6. The process according to any of the preceding claims, **characterized** in that for the drying of the bark or corresponding waste wood there are used gases substantially having a temperature below 200 °C.
- 25 7. The process according to Claim 6, **characterized** in that there is used steam or flue gas having a temperature below 180 °C.
8. The process according to any of Claims 1 – 5, **characterized** in that as the energy for the drying of the solid fuel there is used steam having a pressure of 0.1...100 bar, preferably 2...14 bar.
- 30 9. A process for producing thermal or electric energy in a sulfate pulp mill, according to which process

- the wood material used for pulp production is in part digested in the cooking liquor to separate the fibers from each other,
- the digested wood material is extracted as black liquor from the fiber material,
- the black liquor is concentrated by evaporation, and
- 5 – the concentrated liquor is burned in the soda recovery boiler to regenerate the cooking chemicals and to produce heat and electricity by using biogenic fuels,

characterized in that

- the solid biogenic fuel is brought into a gaseous form,
- the formed ash is separated, and
- 10 – a significant proportion of the gas is burned in the same boiler, equipped with heat recovery, as the concentrated liquor.

10. The process according to Claim 9, **characterized** in that the biogenic fuel to be gasified is wood and/or wood bark and/or bark-containing sludge and/or fiber sludge and/or branch or fiber reject from classification and/or surplus sludge from biologic wastewater
15 treatment.

11. The process according to Claim 9 or 10, **characterized** in that the biogenic fuel to be gasified is logging waste collected from the forest and/or firewood separately harvested from the forest and/or surplus wood from wood processing and/or other wood material suitable for burning.

20 12. The process according to Claim 9, **characterized** in that the biogenic fuel to be gasified is peat.

13. The process according to Claim 9, **characterized** in that the solid fuel to be brought into a gaseous form is dried before the gasification to a moisture content of 5...40 %, preferably 10...15 %.

25 14. The process according to Claim 9, **characterized** in that the solid fuel is dried using the heat remaining after the actual heat recovery in the flue gas formed in the combustion chamber, by bringing the flue gas into direct contact with the solid fuel to be dried.

15. The process according to Claim 9, **characterized** in that the solid fuel is dried using as energy steam at a pressure level of 0.1...100 bar or, however, preferably at a pressure
30 level that is the distribution pressure of the mill's bled steam or back-pressure steam network, preferably at a level of 2...14 bar.

16. The process according to Claim 9, **characterized** in that the solid fuel is dried using as energy the surplus heat that is present at the pulp mill in, for example, various warm waters and expansion steams.
17. The process according to Claim 9, **characterized** in that the combustion chamber is
5 in the direction of the flow of flue gases divided into two parts, in the first of which there is burned the fuel that has been rendered gaseous, the heat produced therefrom being used to a significant degree for the superheating of steam, and in the second part there is burned the concentrated liquor, the heat released therefrom being used primarily for the vaporization of the boiler water.
18. The process according to any of Claims 9 – 17, **characterized** in that a portion of the
10 solid biogenic fuel that has been brought into a gaseous form is, after the separation of ash, burned in the lime sludge reburning kiln and/or other units where its use replaces the use of fossil fuels.
19. An apparatus for producing, from wood bark, a biogenic fuel gas to be fed into the
15 recovery boiler of a pulp mill, the apparatus being connected to the feed unit of the recovery boiler, **characterized** in that it comprises as a combination
- a bark-drying unit (11, 13) having feed means for the bark to be dried and outlet means for the bark that has been dried, and
 - a dried-bark gasifier (14) for producing fuel gas from the bark, the apparatus having
20 feed means for bark and outlet means for fuel gas,
- the feed means of the gasifier being connected to the outlet means of the drying unit and the gas outlet means being connected to the feed unit of the recovery boiler to feed into the boiler the fuel gas produced from the bark by gasification.
20. The apparatus according to Claim 19, **characterized** in that the drying unit (11, 13)
25 comprises at least two separate dryers, which are arranged as a dryer cascade, the outlet means of the dryer subsequent in the series being connected to the feed means of the gasifier.
21. The apparatus according to Claim 20, **characterized** in that between the first and the
30 second dryer there is arranged a pretreatment unit (12) for treating the bark obtained from the first drier before it is fed into the second drier, the pretreatment unit having a feed unit connected to the outlet means of the first drier and an outlet unit connected to the feed means of the second dryer.
22. The apparatus according to Claim 21, **characterized** in that the pretreatment unit (12) comprises a grinder.

23. The apparatus according to any of Claims 19 – 22, **characterized** in that flue gases and/or steam are used for the drying in at least in one of the dryers.
24. The apparatus according to any of Claims 20 – 23, **characterized** in that the first drier (11) comprises a bed dryer.
- 5 25. The apparatus according to any of Claims 20 – 24, **characterized** in that the second dryer (13) comprises a fluid-bed dryer.
26. The apparatus according to any of Claims 19 – 25, **characterized** in that the gasifier (14) is a fluid-bed boiler having an ebullating or rotary bed.
- 10 27. The apparatus according to any of Claims 19 – 26, **characterized** in that the outlet means of the gasifier is connected to a gas purification unit to separate impurities from the fuel gas before it is fed into the recovery boiler.